UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,816	07/11/2003	Linyong Pang	NTI-703-1P1P	5976

29477 7590 09/21/2005

BEVER HOFFMAN & HARMS, LLP
1432 CONCANNON BLVD
BLDG G
LIVERMORE, CA 94550-6006

EXAMINER	
SIEK, VUTHE	

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/618,816	PANG ET AL.	
	Examiner	Art Unit	
	Vuthe Siek	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to application 10/618,816 and amendment filed on 7/5/2005. Claims 1-49 remain pending in the application.

2. Claims 1, 23 and 43 are objected to because of the following informalities: "parameters" in the claims should be specifically defined in order to avoid any claim construction problem. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 4, 6-10, 13-14, 22-23, 25, 27-28, 29-30, 31, 34-35, 43, 45-46 and 48 are rejected under 35 U.S.C. 102(a/e) as being anticipated by Erhardt et al. (6,513,151 B1).

5. As to claims 1, 23 and 43, Erhardt et al. teach a method/system/computer program product for analyzing a mask for use in photolithography (Figs. 4, 5, 8) comprising loading a mask file (new product mask, acquired data from reticle, data packet containing defect analysis information, analysis data) into a defect analysis tool

(Figs. 4, 5, 8, at least summary); specifying a job (a reticle scanning, printability simulation, defect scanning, flat wafer monitoring, critical dimension measuring, full flow product focus exposure matrix monitoring) to be run using the mask file to define parameters (data gathered from each job including data or parameters generated by each of job performed by scanner, printability simulator, defect scanner, flat wafer monitor, critical dimension monitor, full flow product wafer FEM monitor and end of line electrical tester are forwarded to defect analyzer tool) used in the processes performed uniformly for defects on the mask (Figs. 4, 5, 8, at least summary; col. 5 lines 25-45); managing the distributing the job to computation resources (col. 4 lines 25-35, the defect analysis system as taught by Erhardt is operable by parallel processing computer); running the job using the mask file and defined parameters (data or parameters generated by each of job performed by scanner, printability simulator, defect scanner, flat wafer monitor, critical dimension monitor, full flow product wafer FEM monitor and end of line electrical tester are forwarded to defect analyzer tool) (Figs. 4, 5, 8 and its description, summary); and outputting results of the job form computation resources, where the results include printability results for the defects on the mask (Figs. 4, 5, 8 and its description, summary). Applicant is requested to consider whole document.

6. As to claims 4-5 and 25-26, Erhardt et al. teach evaluating a new product mask (analyzing a new product mask) includes detecting errors (defects) in reticle and understanding yield impact of defects. Lithography engineers employ reticle inspection tools to detect the existence of reticle defects. In the mask shop, reticle scans coupled

with printability simulations can be employed to acquire first data. Analyzing FEMs printed on full flow production wafers in conjunction with reticle scans and printability simulations, flat wafer monitoring, critical dimension measurement and analysis facilities collecting information in a plurality of ways (summary, col. 4, lines 45-67; col. 5 lines 25-45; col. 6 lines 4-31; col. 7 lines 18-67; col. 8 lines 1-64). These teachings clearly suggest that there must have parameters including settings relating to the mask, where the settings include at least one of the mask type, phase of the mask, and transmission of the mask in order to evaluating the defects when receiving new product mask.

7. As to claims 6-7 and 27-28, Erhardt et al. teach evaluating a new product mask (analyzing a new product mask) includes detecting errors (defects) in reticle and understanding yield impact of defects. Lithography engineers employ reticle inspection tools to detect the existence of reticle defects. In the mask shop, reticle scans coupled with printability simulations can be employed to acquire first data. Then, in the Fab, engineers may employ automated defect inspection tools to review printed wafers, including wafers printed with FEMs, and to acquire more data associated with critical dimension measurements suitable for defect identification. Analyzing FEMs printed on full flow production wafers in conjunction with reticle scans and printability simulations, flat wafer monitoring, critical dimension measurement and analysis facilities collecting information in a plurality of ways (summary, col. 4, lines 45-67; col. 5 lines 25-45; col. 6 lines 4-31; col. 7 lines 18-67; col. 8 lines 1-64). In addition, Erhardt et al. suggest different inspection system vendor (from Kla-Tencor STARlight) that inherently include inspection system model (col. 5 lines 25-45; Fig. 2). These teachings clearly suggest

that there must have parameters including settings relating to an inspection system that provided information for mask file, wherein the settings include at least one of an inspection system vendor and an inspection system model.

8. As to claims 8 and 29, Erhardt et al. teach evaluating a new product mask (analyzing a new product mask) includes detecting errors (defects) in reticle and understanding yield impact of defects. Lithography engineers employ reticle inspection tools to detect the existence of reticle defects. In the mask shop, reticle scans coupled with printability simulations can be employed to acquire first data. Then, in the Fab, engineers may employ automated defect inspection tools to review printed wafers, including wafers printed with FEMs, and to acquire more data associated with critical dimension measurements suitable for defect identification. Analyzing FEMs printed on full flow production wafers in conjunction with reticle scans and printability simulations, flat wafer monitoring, critical dimension measurement and analysis facilities collecting information in a plurality of ways (summary, col. 4, lines 45-67; col. 5 lines 25-45; col. 6 lines 4-31; col. 7 lines 18-67; col. 8 lines 1-64). In addition, Erhardt et al. teach stepper parameters and spin track parameters for use in defect analyzer (col. 8 lines 12-64).

9. As to claims 13-16, 31, 34-36 and 48, Erhardt et al. teach analyzing and evaluating new product masks for different defects (defect scoring) at multiple levels including printability simulation results (summary, Fig. 2, 4, 5, 6 and 8). Fig. 4, 5 and 8 show defect analyzer coupled to different blocks for evaluating defect masks at multiple levels. For one level (critical dimension monitor), there must have a defect map of the defects on the mask in order to identify the defects.

10. As to claims 10-12, 32-33 and 46-47, Erhardt et al. a system for analyzing and evaluating for mask defects operable on parallel processing system, where the job task is performed by each of the blocks (summary, Fig. 4, 5, 8; col. 4, lines 25-35). These teachings clearly suggest to practitioners in the art, there must have a job manager in the system as taught by Erhardt to manage and distribute the job, allow multiple jobs to be run in parallel and schedule multiple computation resources to run one or more jobs.

11. As to claims 41-42, Erhardt et al. teach a system for analyzing and evaluating new product mask for defects operable on a network (LAN), where printability simulation is performed to predict how features and defects in reticles will print on full flow production wafers. Light transmitted through a reticle can be processed by a photolithography simulator, which can produce predicted aerial images. Predicted critical dimensions can be calculated from the simulation and compared to data collected from later processes that measure actual critical dimensions. Such comparisons facilitate producing yield estimates (col. 5 lines 25-45; 230 Fig. 2, 6). The system operable on a network includes outputting printability results by the printability simulation. The system includes a graphical user interfaces with a web browser to provide the graphical user interface.

12. As to claims 20-22 and 49, Erhardt et al. teach a system for analyzing and evaluating new product mask for defects operable on a network (LAN including a wed browser that can used by multiple users). The system for evaluating different defects at

multiple levels as shown and described in Fig. 4, 5 and 8. Thus different defects must include its status in order for a user can retrieve and review.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 9 and 30 are rejected under 35 U.S.C. 103(a) as being obvious over Erhardt et al. (6,513,151) in view of Mansfield et al. (6,526,164).

15. As to claims 9 and 30, Erhardt et al. does not stepper parameter settings include at least one of wavelength, numerical aperture, reduction, defocus and illumination. Mansfield et al. teach a method for inspecting photomask for defects including validating printing features having a k1 factor larger that about 0.5, where the k1 factor includes parameters of stepper numerical aperture, wavelength of the exposure illumination and feature size in order to allocating an error due amplification of mask errors by lithography process (col. 14-65; Fig. 1a). Therefore, combining the teachings would have been obvious the claimed invention to practitioners in the art since the results would have been as expected.

16. Claims 2-5, 19, 24-26, 39, 41-42 and 44-45 are rejected under 35 U.S.C. 103(a) as being obvious over Erhardt et al. (6,513,151) in view of Avant!...Solutions & Products (Avant!), "Taurus-Lithography, 2/22/01, pp. 1-3. or www.sematech.org/resources/litho/meetings/mask/200107/O_DATA-FORMAT-BO3.PDF (Sematech), "Mask Data Format Standardization, 7/11/01, pages. 1-13.

17. As to claims 2-3, 24 and 44, Erhardt et al. does not teach mask file includes a standard mask format file (MFF) or converting mask data into the standard MFF. Avant! or Sematech teach using standard mask data format where file size is reduced providing following advantages of processing times, computer and network infrastructure costs, data archiving, data transfer to mask shop and mask lithography write time (page 8). Therefore, because of expecting numerous advantages as described above, it would have obvious to one of ordinary skill in the art at the time the invention was made to utilize the standard mask format file (MFF) or converting mask data into the standard MFF in Erhardt's lithographical process.

18. As to claims 19 and 39, Avant! teach with Taurus-Lithography, one can analyze the printability of any very large region of an IC by simulating its aerial image and comparing it to the original mask design in order to improve the printability characteristics by using an optimization algorithm and a selection of models to calculate the printed contour (page 1).

19. As to claims 4-5, 25-26 and 45, Avant' teach settings including at least one of stepper, mask type, phase of the mask, and transmission of the mask (pages 1-3).

20. Claims 16-18 and 36-38 are rejected under 35 U.S.C. 103(a) as being obvious over Erhardt et al. (6,513,151) in view of Potucek et al. (6,498,867).

21. As to claims 16 and 36, Erhardt et al. do not teach defect map. Potucek et al. teach that the data processing system can be set up automatically process captured image data through a digital image and defect map and then to correct the defects using the defect map and digital image (Fig. 3, 7, col. 5, lines 48-57). Integrating the defect map as taught by Potucek into the system of Erhardt et al. would be obvious to one of ordinary skill in the art at the time the invention was made the claimed invention in order to correct the mask defects as expected (col. 5, lines 48-57).

22. As to claims 17 and 37, Erhardt et al. do not teach color-coded based on a defect severity. Potucek et al. teach using color-coded based on a defect severity (first defect, second defect) (col. 3, lines 53-59, col. 5, lines 48-57, col. 6 line 16 to col. 7 line 42, col. 8 lines 23-39).

23. As to claims 18 and 38, Potucek et al. teach using color-coded based on a defect severity (col. 3, lines 53-59, col. 5, lines 48-57, col. 6 line 16 to col. 7 line 42, col. 8 lines 23-39). In order to grab attention to a user, one of ordinary skill in the art at the time the invention was made to indicate a high defect severity with a flashing light to thereby perform mask correction as necessary.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vuthe Siek whose telephone number is (571) 272-1906. The examiner can normally be reached on Increase Flextime.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vuthe Siek

VUTHE SIEK
PRIMARY EXAMINER